

REMARKS

Claims 1-14 are pending. Claims 1, 5 and 12-13 are amended to more particularly point out and distinctly claim Applicant's invention.

Figures 1-3 of the Drawings are amended as required by the Examiner.

The Specification is amended to provide (a) the serial number to a related patent application, (b) to remove embedded hyperlinks to which the Examiner objected, (c) to provide definitions to undefined variables of equations (1) to (8), (d) to complete the sentence on page 19, line 7, and (e) to provide full names of acronyms. Support for the definitions provided are found, for example, in co-pending application 09/770,544, which is incorporated by reference into the Specification of the present Application at page 1, lines 4-7. Reference numeral 500 of Figure 6 is now referenced in the amended Specification. Accordingly, the Examiner's objections are deemed overcome.

The Examiner rejected Claims 2-6, 13 and 14 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enable requirement. Specifically, the Examiner states:

The Specification does not provide sufficient details to enable [one] skilled in the art to make and use the invention because it does not adequately describe the following:

Regarding claims 2-4, how to predict the future location of mobile node using deterministic, stochastic or adaptive prediction, as equations 1-8 describing these processes lack numerous variables.

Regarding claim 5, how to predict the future locations of the mobile node using selected variable in the L3 network layer;

Regarding claim 13 means for predicting the mobility of said mobile node, means for comparing the mobility with new value, means for taking a desired action;

Regarding claim 14, means for locating a second router, means for pre-registering a new direct route and means for switching the connections to second fixed router.

Applicant respectfully traverses the Examiner's rejection. With respect to Claims 2-4, as amended, the Specification now recites definitions for all variables in equations (1) to (8).

With respect to Claim 5, Applicant's Specification, at page 17, lines 19-25, provide as an example mobility prediction analysis 710 based on Layer 3 beacons, which are data packets transmitted by base transmitter stations as a network layer data communication protocol transparent to the network. Applicant's Specification, at page 18, lines 15-18, teaches selecting "packet latency" as the variable for the mobility prediction analysis, using deterministic, stochastic or adaptive methods. Therefore, the subject matter of Claim 5 is adequately taught in Applicant's Specification.

With respect to Claim 13, Applicant's Specification, beginning at page 17, line 31 to page 18, line 1, teaches means for comparing:

The mobility prediction analysis 710 results in the determination of a threshold value selected to indicate when a hand-off is imminent sufficiently prior to the time actual hand-off is required ...

Applicant's Specification, beginning at page 20, line 21 to page 24, line 11, for example, teaches numerous "means for taking a desired action." Therefore, the subject matter of Claim 13 is adequately taught in Applicant's Specification.

With respect to Claim 14, Applicant's Specification, beginning at page 20, line 21 to page 21, line 11, teaches "means for locating a second fixed agent or router"; Applicant's Specification, beginning at page 21, line 12 to page 22, line 18, teaches various "means for pre-

registering”; Applicant’s Specification, beginning at page 22, line 18 to page 24, line 11, teaches various “means for pre-establishing a new direct network data route”; and Applicant’s Specification, beginning at page 24, line 12 to page 25, line 7 various “means for switching said mobile node’s network connection from said first fixed agent or router to said second fixed agent or router.” Thus, the subject matter of Claim 14 is adequately taught in Applicant’s Specification.

Thus, for the reasons stated above, Applicant respectfully submits that Claims 2-6, 13 and 14 each fully comply with the enablement requirement of 35 U.S.C. § 112, first paragraph.

The Examiner rejected Claims 5-6, and 12-14 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite, citing numerous formal defects in these claims. As amended, Applicant believes the formal defects in these claims are cured, and the Examiner’s rejection is overcome.

The Examiner rejected Claims 1, 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication 2002/0080752 (“Johansson”) in view of the paper “Predictive Schemes for Handoff Prioritization in Cellular Networks based on Mobile Positioning,” *IEEE Journal of Selected Areas in Communication*, vol. 18, No. 3, March 2000, pp. 510-522 (“Chiu”). With respect to Claim 1, the Examiner states:

Regarding claim 1, Johansson substantially teaches the limitations of the claim. A method of communicating in a wireless, mobile access digital data network having a plurality of agents/routers for interfacing mobile nodes with the data network (Fig. 3a and 0035-0036), comprising:

Establishing a communication link between said mobile node (mobile node 3 on Fig. 3a and 3b, 0077) and said network via a first router/agent (agent 2a on Fig. 3b);

Establishing a communication link between correspondent node (correspondence node 4a on Fig. 3b) and said network via second router/agent (home agent 1 on Fig. 3b);

Establishing data communication between the mobile node and the corresponding node via a first data route including said first and second routers/agents (mobile IP tunnel 30a on Fig. 3a and 0074);

Establishing a second data route for data communication between said mobile node and said correspondence node including said second and third routers/agents (agents 1 and 2b on Fig. 3b and 0077);

Transferring said communication link between said mobile node and said network from first router to the third router (communicating between correspondent node 4a and mobile node 3 through IP tunnel 30b on Fig. 3b and 0077).

Johansson does not teach predicting the future location of mobile node and determining based on the prediction when the communication link should be transferred from the first router to the third router.

Chiu teaches predicting the future location of mobile node (III. Predictive channel reservation on page 512) and determining based on the prediction when the communication link should be transferred from first router to the third router (Handoff from current cell to next cell on page 510).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add predicting the future location of mobile node and determining based on the prediction when the communication link should be transferred from the first router to the third router of Chiu to the system of Johansson to improve the system end-to-end latency.

Applicant respectfully traverses the Examiner's rejection. As amended, Claim 1 recites, in pertinent part:

1. (Currently amended) In a wireless, mobile access digital data network having a plurality of mobile and fixed nodes, and a plurality of agents/routers for interfacing said mobile nodes with said data network, a method of communicating data between a mobile node and a mobile or fixed correspondent node in said network, comprising:

* * *

predicting the future location of said mobile node relative to said first agent/router and a third agent/router using a network layer data communication protocol;

determining based on said prediction when said communication link between said mobile node and said network should be transferred from said first agent/router to said third agent/router;

establishing a second data route for data communications between said mobile node and said correspondent node including said second and third agents/routers; and

transferring said communication link between said mobile node and said network from said first agent/router to said third agent/router.

(emphasis added)

Using a network layer communication protocol allows data packets to be transported efficiently not only at the link layer (i.e., hardware) level, but at the network level, where higher or logical level efficiencies can be exploited. Thus, packet latency (page 18, lines 15-19) or route optimization (pages 22-24) techniques may be applied. In contrast, as described, for example on Chiu's page 510, Chiu performs its mobility prediction based on "real-time position measurement and movement extrapolation (i.e., measurement of a physical/geographical position), which does not take into consideration network traffic conditions. Thus, the combined teachings of Johansson and Chiu neither discloses nor suggests Applicant's Claim 1. Accordingly, Applicant respectfully submit that Claim 1 and therefore its dependent Claims 7-8 are each allowable over Johansson and Chiu, individually and in combination. Reconsideration and allowance of Claims 1, 7 and 8 are therefore requested.

The Examiner rejected Claims 9-11 under 35 U.S.C. § 103(a) as being unpatentable over Johansson and Chiu in view of admitted prior art. The Examiner states:

Johansson and Chiu substantially teach all the limitations of the parent claim 1. Johansson and Chiu do not teach using IMT 2000, Mobile IP version 4 and 6 standards. Admitted prior art (current application page 5 lines 2-28) teaches using IMT 2000, Mobile IP version 4 and 6 standards in third generation data networks.

It would have been obvious to one of ordinary skill in the art to use IMT 2000, Mobile IP version 4 and 6 standards of admitted prior art in the system of Johansson and Chiu to improve the system compatibility with network equipment utilizing popular standards.

Applicant respectfully traverses the Examiner's rejection. As discussed above, the combined teachings of Johansson and Chiu do not teach or suggest the parent Claim 1, as neither reference teaches using a network layer data communication protocol for future location prediction. Accordingly, the combined teachings of Johansson, Chiu and admitted prior art also do not teach or suggest Claims 9-11, which each depend from Claim 1. Thus, reconsideration and allowance of Claims 9-11 are requested.

The Examiner rejected Claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Chiu in view of Johansson. The Examiner states:

In a wireless (cellular system, page 510) system, predicting a mobility of the mobile node relative to a fixed agent (prediction of the motion of MS on page 512),

Comparing said predicted mobility to a predetermined threshold value (threshold distance on page 516);

If said predicted mobility meets or exceeds said threshold value, locating a second agent (starting handoff to next cell Fig. 1 and page 512);

Pre-registering said mobile node with second agent (sending a reservation request to a new BS on page 512);

Pre-establishing a new network data route between said mobile node and said correspondent node via second fixed agent (completing the handoff process to a new BS).

Chiu does not teach router/agents for interfacing the mobile nodes to the core network and switching the mobile node connection from one fixed agent to the other.

Johansson teaches routers/agents for interfacing the mobile nodes to the core network (agents 1 and 2 on Fig. 3b) and switching the mobile node connection from one fixed agent to the other (mobile IP tunnel 30b on Fig. 3b).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add routers/agents for interfacing the mobile nodes to the core network and switching the mobile node connection from one fixed agent to the other of Johansson to the system of Chiu to use internet as a core network to the system.

Applicant respectfully traverses the Examiner's rejection. As amended, Claim 12

recites:

12. In a third or beyond generation all-IP, wireless, mobile access, IP-based data network having a core network, a mobile node, a fixed or mobile correspondent node, and a mobile IP backbone comprising a plurality of routers/agents for interfacing said mobile nodes to the core network, a method of dynamically changing the network data routing between said mobile node and said correspondent node, comprising:

using a network layer communication protocol, predicting a mobility parameter value of said mobile node relative to a first fixed agent or router having a network connection with said mobile node;

comparing said predicted mobility parameter value to a predetermined threshold value;

if said predicted mobility parameter value meets or exceeds said threshold value,

locating a second fixed agent or router;

pre-registering said mobile node with said second fixed agent or router;

pre-establishing a new network data route between said mobile node and said correspondent node via said second fixed agent or router;

then switching said mobile node's network connection from said first fixed agent or router to said second fixed agent or router.

(emphasis added)

As discussed above, neither Chiu nor Johansson teach or disclose using a network layer communication protocol to predict a mobility parameter value. Thus, for the reasons already stated above, Applicant submits that Claim 12 is allowable over the combined teachings of Chiu and Johansson.

The Examiner rejected Claims 13-14 under 35 U.S.C. § 103(a) as being unpatentable over Chiu and Johansson. The Examiner states:

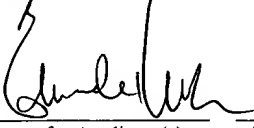
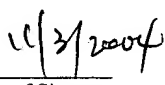
Chiu and Johansson substantially teach all the limitations of claims 13 and 14 as shown in claim 12 rejection above.

Chiu and Johansson do not teaching making a device utilizing the disclosed method. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make a device utilizing the disclosed method of Chiu and Johansson to implement the system.

Applicant respectfully traverses the Examiner's rejection. As discussed above, the combined teachings of Johansson and Chiu do not teach or suggest parent Claim 12, as neither reference teaches using a network layer data communication protocol for predicting a mobility parameter value. Accordingly, the combined teachings of Chiu and Johansson also do not teach or suggest Claims 13-14, which depend from Claim 12. Thus, reconsideration and allowance of Claims 13-14 are requested.

Therefore, Applicant believes that all pending claims (i.e., Claims 1-14) are allowable, and respectfully request their allowance. If the Examiner has any questions regarding the above,

the Examiner is respectfully requested to telephone the undersigned Attorney for Applicant at 408-392-9250.

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Respectfully submitted,



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